“EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE AND ROCABADO EXERCISE VERSUS THERAPEUTIC JAW EXERCISES FOR TEMPOROMANDIBULAR JOINT DYSFUNCTION”

A Dissertation Submitted to

The Tamilnadu Dr.M.G.R.Medical University,

CHENNAI

In partial fulfillment of the requirements

For the award of the

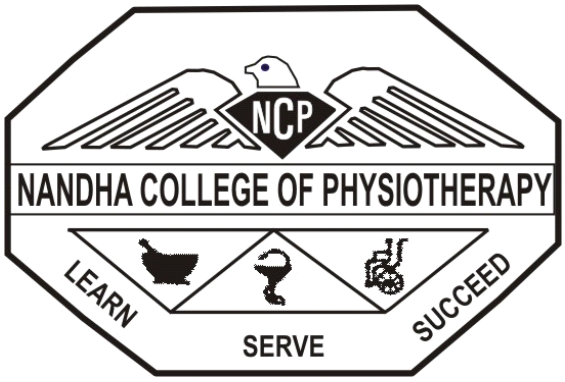
MASTER OF PHYSIOTHERAPY

(Advanced Physiotherapy in Orthopaedics)

DEGREE

Submitted by

Reg.No.271410064



NANDHA COLLEGE OF PHYSIOTHERAPY

ERODE -638 052

APRIL 2016

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The dissertation entitled

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Under the guidance of

Prof.V.MANIVANNAN.,M.P.T

A Dissertation Submitted to

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Dissertation Evaluated on ……..

Internal Examiner External Examiner

CERTIFICATE BY THE HEAD OF THE INSTITUTION

PROF.V.MANIVANNAN, M.P.T. (ORTHO)
Principal/Head of the Institution,
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This is Certify that **(Reg. No. 271410064)** is a Bonafide student of **Nandha College of Physiotherapy, studying Master of Physiotherapy (Advanced Physiotheraphy in orthopaedics)** degree course from the year 2014-2016. The dissertation entitled, **"EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE AND ROCABADO EXERCISE VERSUS THERAPEUTIC JAW EXERCISES FOR TEMPOROMANDIBULAR JOINT DYSFUNCTION"** is a record of original and independent work done by her under the guidance of me.

I wish her a great success in her dissertation work.

Place : Signature of Principal

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This is to certify that this dissertation entitled, **"EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE AND ROCABADO EXERCISE VERSUS THERAPEUTIC JAW EXERCISES FOR TEMPOROMANDIBULAR JOINT DYSFUNCTION"** submitted by (Reg.No.271410064) is a record of original and independent work done by the candidate during the period of study under my supervision and guidance. The dissertation represents entirely and independent work on the part of the candidate but for the general guidance by me.

Place :

Date:

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DECLARATION

I here, by declare and present my project work entitled **"EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE AND ROCABADO EXERCISE VERSUS THERAPEUTIC JAW EXERCISES FOR TEMPOROMANDIBULAR JOINT DYSFUNCTION"** is outcome of original research work was under taken and carried out by me under the guidance of **Prof. V.MANIVANNAN.,M.P.T.,**

To the best of my knowledge this dissertation has not been formed in any other basic for the award of any other degree, diploma, associateship, fellowship, previously form, any other medical university.

Register No:
271410064

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INTRODUCTION

Temporomandibular joint is the only synovial joint of the skull which connects the jaw to the temporal bones of the skull. Temporomandibular dysfunction is a group pathologies affecting the masticatory muscles, the temporomandibular joint and its related structures or both. Temporomandibular dysfunction is manifested by many symptoms including jaw pain, click or popping of jaw movement limitation, tenderness, headache and tinnitus. Researchers generally agree that temporomandibular dysfunction fall into three main categories myofascial pain, the most common form of temporomandibular dysfunction, internal derangement of joint and degenerative joint disease and it is estimated that more than 85 to 90 % of people will display one or more of the temporomandibular symptoms in their life time (souza 1997)

1.1 OPERATIONAL DEFINITION

i) TEMPEROMANDBULAR JOINT DYSFUNCTION

Temporomandibular joint dysfunction comprise a constellation of signs and symptoms including joint tenderness and pain on function restricted joint movement, clicking, jaw locking and tenderness in the muscle of mastication

ii) MUSCLE ENERGY TECHNIQUE

Muscle energy techniques are manipulative procedures that have evolved out of osteopathic medicine to lengthen muscle and fascia, to mobilise joints, to strengthen a physiologically weakened muscles, to reduces localized edema and relieve passive congestion. In this technique the patient actively uses their muscles against a counter force produced by the practitioner

iii) ROCABADO EXERCISES

Dr.Mariano Rocabada created a series of exercises, which refers to a system of movements that help to treat temporomandibular joint dysfunction. The exercises deals with the relationship of your head, neck to shoulders and lower jaw to upper jaw.

iv) THERAPEUTIC JAW EXERCISES

These are of great value and helps to achieve the relaxation of the tense muscle to retain the coordination and rhythmic muscle function to increase mandible range of motion to increase muscle strengths.

v) HELKIMOS ANAMNESTIC INDEX

It is a 5 item scale in which an item has 3 ranked detractors scored from 0 to 5. So a total score of 25can be compiled. First section is on impaired range of movement / mobility index and the second section is on impaired temporomandibular joint function and the third section is on the muscle pain and the fourth section is on temporomandibular joint pain and the fifth section is on the pain on movement of the mandible.

1.2 NEED FOR THE STUDY

Temporomandibular dysfunction appears relatively common occurring in approximately 10% of the population over age 18 it is primarily a condition of young and middle aged adults, rather than of children or the elderly and is approximately twice as common in women as in men (Leresche -1997; 628)

There are approximately 17,800,000 work days lost every year for every 100,000,000 full time working adults in the United States as a result of debilitating temporomandibular joint dysfunction (Okeson -1996; 117)

It can be treated by wide variety of interventions here we concern about the treatment with Muscle energy technique with Rocabado exercises and Therapeutic jaw exercises

The appropriateness and effectiveness of Muscle energy technique with Rocabodo exercises in group I and Therapeutic jaw exercises in group II forms the focus of the study

1.3 AIM OF THE STUDY

The aim of this study was to compare the effectiveness of the treatment applied in group I (muscle energy technique and rocabado exercises) group II (therapeutic jaw exercises). Treatment effectiveness between group I and group II was assessed by Helkimos anamnestic index.

1.4 OBJECTIVES OF THE STUDY

To find out the efficacy of treatment used in both group I and II HELKIMOS ANAMNESTIC INDEX was used to assess the patients response and also taken as the parameter to quantify the effectiveness of treatment

The first objective was to record the pain rating before and after the treatment by Muscle energy Technique along with Rocabado exercises and Therapeutic jaw exercises

The second objective was to record the disability rating before and after the treatment by Muscle energy technique along with Rocabado Exercises and Therapeutic jaw exercises

The third objective was to evaluvate the data obtained from objectives one and two in order to determine whether one of these intervention is more beneficial in treating the temporomandibular joint dysfunction

1.5 HYPOTHESIS

NULL HYPOTHESIS

There is no significant difference in effects obtained between group I (muscle energy technique along with Rocabado exercises) and group II (Threapeutic jaw Exercises)

ALTERNATE HYPOTHESIS

There is significant difference in effects obtained between (Muscle energy technique along with Rocabado exercises) and group II (Therapeutic jaw exercises)

2. REVIEW OF LITERATURE

1. **ERIC s, FURTO, JOSHUA A, CLELAND, JULIE A WHITMAN**, Journal of craniomandibular practice October 2008. The results suggested that patients with temporomandibular joint dysfunction who are treated with a rehabilitation program including manual physical therapy interventions and exercise can demonstrate clinically meaningful improvements in disability and overall perceived change in a relatively short period of time.
2. **LINDSAY PHIPPS EISENSMITH 2007.** A single cause study report of combined effect of Muscle energy techniques and ultrasound for the temporomandibular joint syndrome journal of body work and movement therapies January (2007) 11,223-230 States that the combined effect of muscle technique and ultrasound can improve the jaw range of motion, alleviate the intensity and reduce the frequency of temporomandibular joint related pain without surgical or pharmacological intervention
3. **ANDERSON, NATALIE 2007**, state that muscle energy technique had an effect on the vertical range of opening of the mandible of the temporomandibular joint.
4. **ALLAN KALAMIR, HENRY POLLARD, ANDREW L.VITIELLER, ROD BONELLO,** January 2007 manual therapy for temporomandibular disorder, volume 11, issue 1, page 84-90. The results of manual therapy trials for the temporomandibular joint disorders suggest that manual therapy is a viable and useful approach in the management of temporomandibular joint disorders.
5. **KAYNA VALLE, COROTTI, ARNALDO PINZAN,** journal of applied oral science, april 2007 Helkimos anamnestic index a 5 item scale and is one of the most universally accepted questionnaires for temporomandibular joint.
6. **CLELAND, J., PALMER,J**. 2006 A systematic review of the effectiveness physical therapy interventions for temporomandibular disorders. Physical therapy 86 (5) 710-725 state that the muscle energy technique have a relaxing effect on those muscles which are shortened or tight and which are acting to restrict opening of the mandible.
7. **DIVYA SOOD, SUBRAMANIAM ARUN V**, International journal of applied sciences and biotechnology December, 2014 uses Anamnestic questionnaire and stated that it was high efficiency in obtaining a diagnosis and easy to apply.

8. **FRESHWATER Z, GOSLING C** 2005. The effect of a specific isometric music energy technique on range of opening of temporomandibular joint: A pilot study journal of osteopathic medicine, march (6) : 36 States that the result of this study indicate that muscle energy technique and therapeutic jaw exercises are useful techniques in improving the temporomandibular joint range of motion.
9. **WHALUND, K., LIST, T., LARSSON** 2005. Heating effects of ultrasound to temporomandibular joint in journal of prosthetic dentistry, volume 26, July 30 (7) 368-83. States that using ultrasound, temperature increased by only a few degrees and it is within the margin of safety for the dentalpulp and it is highly reliable for treating patient with temporomandibular joint dysfunction.
10. **JAMES R.FRICTON.** October 2004 The relationship of temporomandibular and fibromyalgia in journal of current pain and headache reports, issue volume 8, number 5 States that it has been found that the widespread pain, decreased range of motion associated with fibromyalgia may play a significant role in the chronicity of patients with temporomandibular joint dysfunction.
11. **YAPA,CHA E, HOE K**, 2004 faculty of dentistry, university Singapore, 6 march stated that muscle energy technique increases the jaw opening and to corrects the forward head posture.
12. **SANDFORD L SHEKLOW, ISRAEL BLOOMENFELD**, Physiotherapy January 2001. The manual mobilization with exercise group demonstrated a significant decrease in total pain level and improved mouth opening. The soft repositioning splint group failed to show significant change in either variable
13. **CUCCIA.M,CARADONNA,V.ANNUZIATE,** 2000 osteopathic manual therapy versus conventional conservative therapy in the treatment of temporomandibular disorders, a randomized controlled trial State that both had similar results in patients with temporomandibular joint disorder, but osteopathic manual therapy is a valid option for the treatment of temporomandibular joint disorder.
14. **P.NICOLAKIS, B.ERDOGMUS**,.KOPII,2000 journal of oral rehabilitation, volume 28, issue 12, page 1158_1164. Exercise therapy improves the range of motion and alters the anterior disk displacement in temporomandibular joint dysfunction
15. **JAGGER BATES AND KOPP** (1994) and Okeson (1996) has given many indication for applying muscle energy technique along with Rocabado exercises.

16. **CERNICH M.D, DAVIES O** July 1993, randomized controlled trail of exercises for temporomandibular joint, 234 237 States that Rocabado exercise program improves the long term outcome in patients with temporomandibular joint dysfunction. The exercise program was highly acceptable and cost effective in terms of direct cost and in reading disability.
17. **HACKNEY J, BADE D, CLAUSON A,** 1982 Stated that the relationship between forward head posture and diagnosed internal dearrangement of temporomatidibular joint.

3. MATERIALS AND METHODOLOGY

3.1MATERIALS

- Manipulation couch
- Assessment chart
- Armed chair
- Pillows
- Towels
- Inch tape
- Goniometer

3.2 METHODOLOGY

The objective of this study was to compare muscle energy technique along with rocabado exercises and therapeutic jaw exercises alone in terms of subjective and objective clinical findings, in order to determine which intervention is more effective in treating temporomandibular joint dysfunction.

a) STUDY DESIGN

A Quasi experimental design was conducted to compare the treatment effects in different groups of patients in a simplest form of construction.

b) STUDY SETTING

The study was conducted at

- SIMS Hospital, Erode.
- LKM Hospital, Erode.
- Nandha College of physiotherapy, Perundurai
- Government Head Quarters Hospital, Erode
- Sudha Dental clinic, Namakkal

c) SAMPLING

By convenient sampling method subjects were selected according to their oral consent and assessed thoroughly and sampling technique was employed for all presenting participants that met the inclusion and exclusion criteria for the study

- **SAMPLE SIZE**

Thirty patients (30) were selected who fitted the inclusion criteria and were excluded by means of the exclusion criteria in the study.

- ✓ **Group –I**

  Consisted of 15 patients who underwent muscle energy technique along with rocabado exercises.

- ✓ **Group –II**

  Consisted of 15 patients who were treated therapeutic jaw exercises.

d) CRITERIA FOR SELECTION OF SAMPLES

- ❖ **INCLUSION CRITERIA**
  - ✓ Age group between 20-50 years
  - ✓ Pain in temporomandibular joint
  - ✓ Restricted jaw movement
  - ✓ Clicking or crepitus in the temporomandibular joint
  - ✓ Jaw locking
  - ✓ Pain aggravated by chewing or other jaw function
  - ✓ Bruxism or other habitual jaw clenching activities
- ❖ **EXCLUSIVE CRITERIA**

  Patients were excluded from the study if any of the following exclusion criteria persent.

- ✓ Fracture of jaw or temporomandibular joint
- ✓ Any history of temporomandibular joint surgery
- ✓ Malignant tumors of face or jaw
- ✓ Neurological deficits including bell's palsy, previous or present symptoms of Cardiovascular accidents (CVA). trigeminal neuralgia (Dippenaar, 2003).
- ✓ Subjects have/had dental/orthodontic treatment within past seven day

e) STUDY DURATION

The study was carried out for a period of 6 months and each patient is treated for a period of 3 weeks.

3.3 PARAMETERS

HELKIMO'S ANAMNESTIC INDEX

3.4 TECHNIQUES OF APPLICATION

The 30 selected participants were randomly divided into two groups of 15. A brief explanation and demonstration about muscle energy technique, rocabado exercises and temporomandibular joint exercise were given to the selected subjects.

An assessment was taken to all the selected subjects. In addition helkimos anamnestic index were also taken for all the patients. Instructions were given to the patients about the treatment program that he or she underwent according to the groups they belong.

- ✓ **GROUP I:**

Patients were positioned accordingly and muscle energy technique and rocabado exercises were given as in the protocol

3.5 PROCEDURE

Fifteen patients received muscle energy technique along with rocabado exercises.

A) MUSCLE ENERGY TECHNIQUE

Muscle energy is a technique whereby the patient actively uses their muscles against a counterforce produced by the therapist. The therapist controls the intensity, timing and direction. According to **Green man,** muscle energy technique can be used to

- ❖ Lengthen a shortened, contracted or spastic muscle
- ❖ To strengthen a physiologically weakened muscle or group of muscles
- ❖ To reduce localized oedema and relieve passive congestion (the muscles are the pump of the lymphatic and venous systems)

I. ***Muscle energy technique :*** Temporomandibular joint method I.

- ✓ Reciprocal inhibition is the objective when the patient is asked to open the mouth against resistance applied by the practitioners, or the patients own hand
- ✓ This have a relaxing effect on the muscles which are shortened or tight.

II. ***Muscle energy technique*** : Temporomandibular joint method II

- ✓ To relax the tight muscles being post isometric relaxation, counterpressure would be required in order to prevent the open jaw from closing (using minimal force) by placing the thumbs along the superior surface to the lower back teeth while an isometric contraction was performed by the patient.
- ✓ This relax the tight muscle

III. Muscle energy technique : temporomandibular joint method III

Lewit (1999) maintaining the laterolateral movements are important, suggests the following method of treating temporomandibular joint problems using post isometric relaxation

- ✓ The patient opens his mouth allowing the chin to drop and the practitioner cradles the mandible with his left hand so that the fingers are curled under the jaw, away from him.
- ✓ This increases the lateral excursion of the mandible

MUSCLE ENERGY TECHNIQUE PROTOCOL

The above mentioned technique were given to the patients as in the following protocol:

- ➢ Each technique for 5 repetitions
- ➢ 10 contractions
- ➢ 30 mins exercise program per day
- ➢ 3-4 days a week
- ➢ 3 weeks program

B) ROCABADO EXERCISES

PROFESSOR MARIANO ROCABADO is a specialist in craniomandibular and craniovertebral dysfunction. The exercise program addressed postural relationship with the head to neck, neck to shoulders, and lower jaw to upper jaw. Rocabado advocates the instruction of 6 functional components of activity for treatment of the temporomandibular joint dysfunction. He recommends that patient complete each activity 6 times a day.

- ❖ Rest position of the tongue
  - ✓ Make a clucking sound with the tongue for 6 times
  - ✓ Find normal testing position = holding one third of tongue gently against the roof of the mouth just behind the front teeth
  - ✓ Diaphragmatically breathe through nose while tongue is in resting position for 6 breathes
- ❖ Control temporomandibular joint rotation on opening
  - ✓ Tongue on roof of mouth and open for 6 repetitions

- ❖ Mandibular rhythmic stabilization
  - ✓ Apply light resistance to opening, closing and lateral deviation with the jaw in a resting position holding for 6 seconds
- ❖ Stabilized head flexion
  - ✓ Upper cervical flexion (nodding) facilitates upper cervical flexion as most of these patients have forward head posture resulting in upper cervical extension deviation. Nod head for 15 degree back and forth for 6 repetitions
- ❖ Lower cervical retraction
  - ✓ Chin tuck for 6 seconds and hold
- ❖ Shoulder girdle retraction
  - ✓ Pull shoulder back and down, hold for 6 seconds.

EXERCISES PROTOCOL

The above mentioned exercises were given to the patients as in the following protocol

- ❖ Each exercises for 6 repetitions
- ❖ 6 days a week
- ❖ 3 weeks program

GROUP II

Patients were positioned accordingly and TME was given to the affected area.

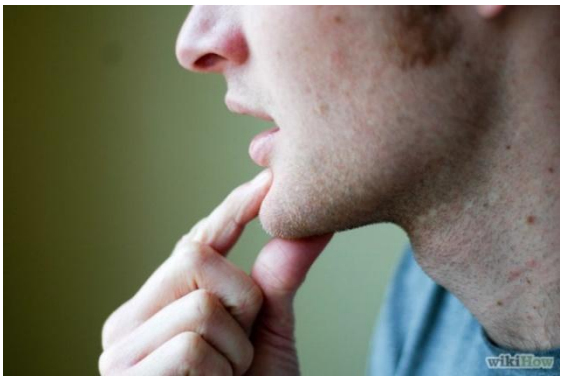
C) THERAPEUTIC JAW EXERCISES

Therapeutic jaw exercises are of great value in the treatment of TMD. The following five exercises were taught to the patients

1. Place your mouth through some resistance training

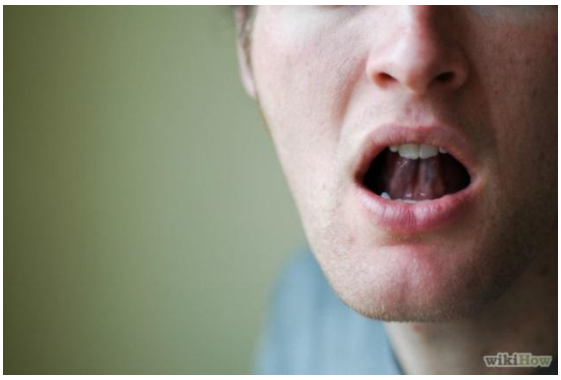
- ❖ Place you thumb underneath the centre of the chin
- ❖ Open your mouth slowly by lowering your jaw while appling steady light pressure to the bottom of your chin with the thumb
- ❖ Hold it for 3-6 seconds and close slowly

2. Exercise the joint in the opposite direction by providing resistance while closing your mouth



- ❖ Place the thumb underneath the jaw and the index finger on the joint of the jaw
- ❖ Push lightly wit both the thumb and the index finger as by closing the mouth

3. Hold the tongue on the roof of the mouth by slowly opening and closing the jaw



4. Exercise jaw with side – to –side movement

- ❖ Place and object that is less ½ inch thick between the teeth (example): pencil, popsicle stick
- ❖ Move the jaw slowly to one side then the other

5. Put the same item between the front teeth to exercise the jaw with a forward Motion

- ❖ Slowly move your bottom jaw forward until the upper teeth are behind the lower teeth

Exercise protocol

The above mentioned exercises were given to the patients as in the following protocol

- ❖ First two exercises for 6 repetitions
- ❖ Third, fourth and fifth exercises for several times
- ❖ Daily
- ❖ Three weeks program

Regular periodic assessment was taken for both the groups at every weekends and after completion of 3 weeks final assessment was taken and measurements were recorded.

3.6 OUTCOME MEASURE

The pain level, range of movement/mobility index, muscle pain of patient, disability level was measured by using the Helkimos Anamnestic Index, before the commencement of treatment technique and were taken as pre – treatment values. Measurements were also made in between at various points of time, to monitor progression. Measurements were made after the end of the final treatment session and were taken as post – treatment values.

4. DATA PRESENTATION AND ANALYSIS

The original data (Helkimos Anamnestic Index,) collected form both of the groups of patients were included in the appendix. After 3 weeks treatment program the post treatment (Helkimos Anamnestic Index,) were noted

The pre and post treatment scores were manipulated and subjected to statistical analysis and the results were obtained.

4.1 VARIABLES OF THE STUDY

- ***Independent variable***
  - ✓ Muscle energy technique
  - ✓ Rocabado exercises
  - ✓ Temporomandibular joint exercises
- ***Dependent variable***
  - ✓ Helkimos Anamnestic Index

4.2 STATISTICAL TOOLS USED WERE

To compare the effects of treatments program in each group, students 't' test for paired values was used.

The formula used for the test is

Formula : Paired t –test

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

$$s = \sqrt{\frac{\Sigma d^2 - \frac{(\Sigma d)^2}{n}}{n-1}}$$

d = difference between the pre test vs. post test

d = mean difference

n = total number of subjects

s = standard deviation

The unpaired t-test was used to compare the statistically significant difference in the dependent variables between Group I and Group II subjects.

Formula : Unpaired t-test

$$s=\sqrt{\frac{\Sigma(x_1-\bar{X}_1)^2+\Sigma(x_2-\bar{X}_2)^2}{n_1+n_2-2}}$$

$$t=\frac{\bar{X}_1-\bar{X}_2}{s}\sqrt{\frac{n_1-n_2}{n_1+n_2}}$$

n_1 = total number of subjects in Group I

n_2 = total number of subjects in Group II

X_1 = Difference between pre test vs. post test Group I

$\overline{X}_1$ = Mean of the difference between pre vs. post test of Group I

X_2 = Difference between pre test vs. post of Group II

$\overline{X}_2$ = Mean of the difference between pre test vs. post of Group II

To compare the effects between two groups, unpaired 't' test values, was used

TABLE 1

MEAN DIFFERENCE VALUES FOR GROUP I AND GROUP II

GROUPS	MEAN DIFFERENCE
GROUP I	5
GROUP II	2.6

The above table shows mean difference values for

GROUP I – muscle energy technique along with rocabado exercises

GROUP II – therapeutic jaw exercises

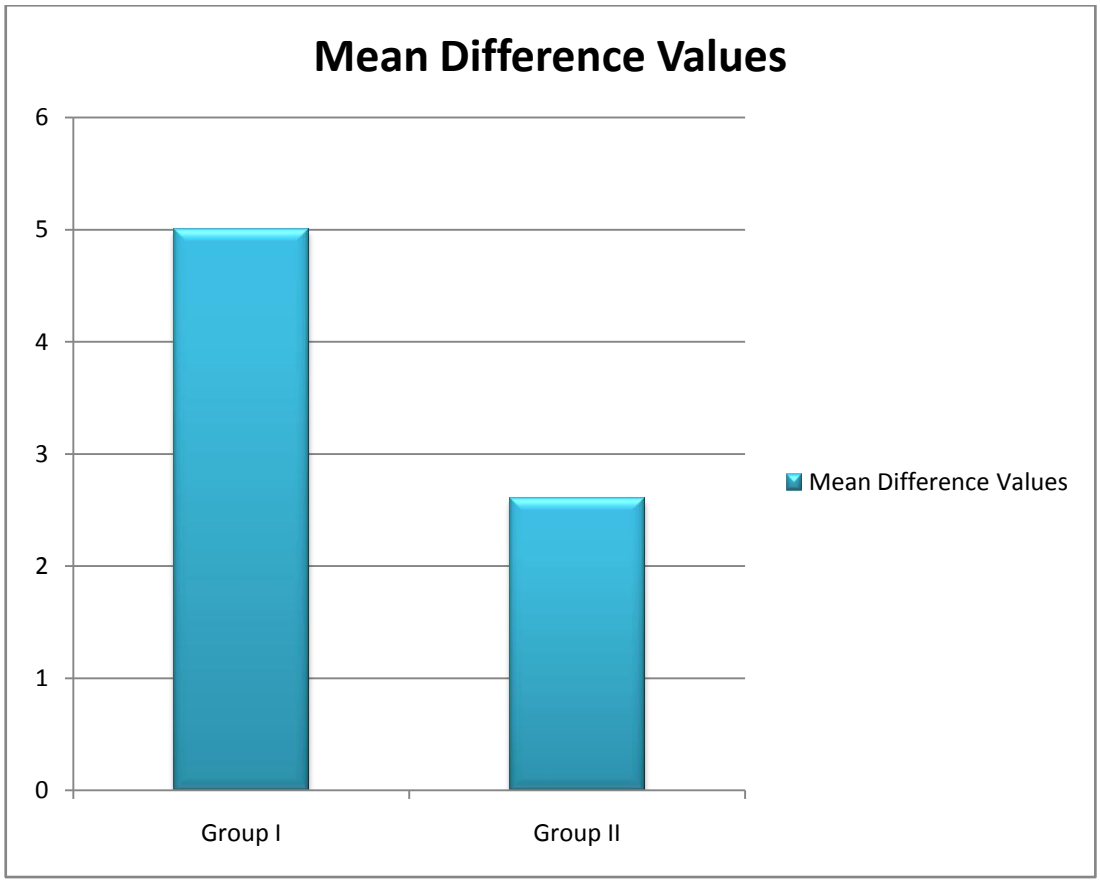


TABLE 2

STANDARD DEVIATION VALUES FOR GROUP I AND GROUP II

GROUPS	STANDARD DEVIATION VALUES
GROUP I	2.07
GROUP II	1.26

The above table shows standard deviation values for

GROUP I –muscle energy technique with rocabado exercise

GROUP II – therapeutic jaw exercises

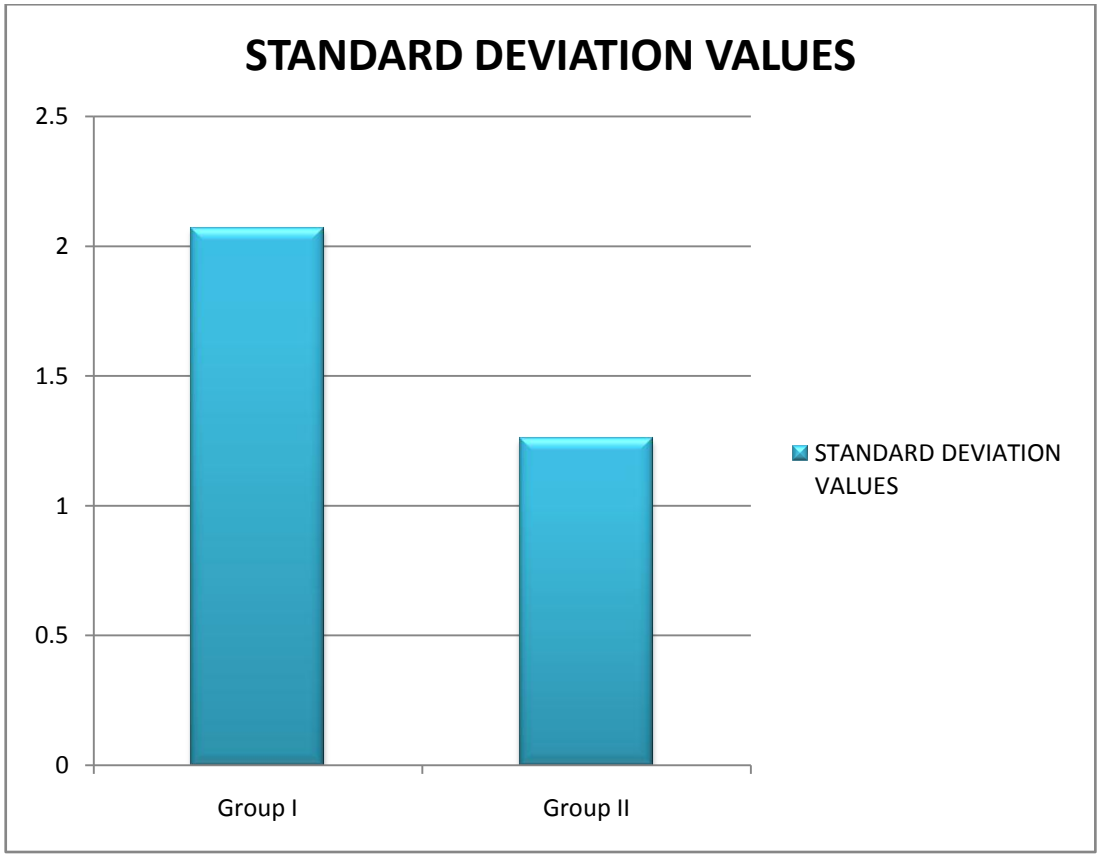


TABLE 3

PAIRED 'T' TEST VALUES FOR GROUP I & II

GROUPS	Calculated 't' Values	Table Values
GROUP I	9.35	2.15
GROUP II	7.9	2.15

't' values for group I & II with table value

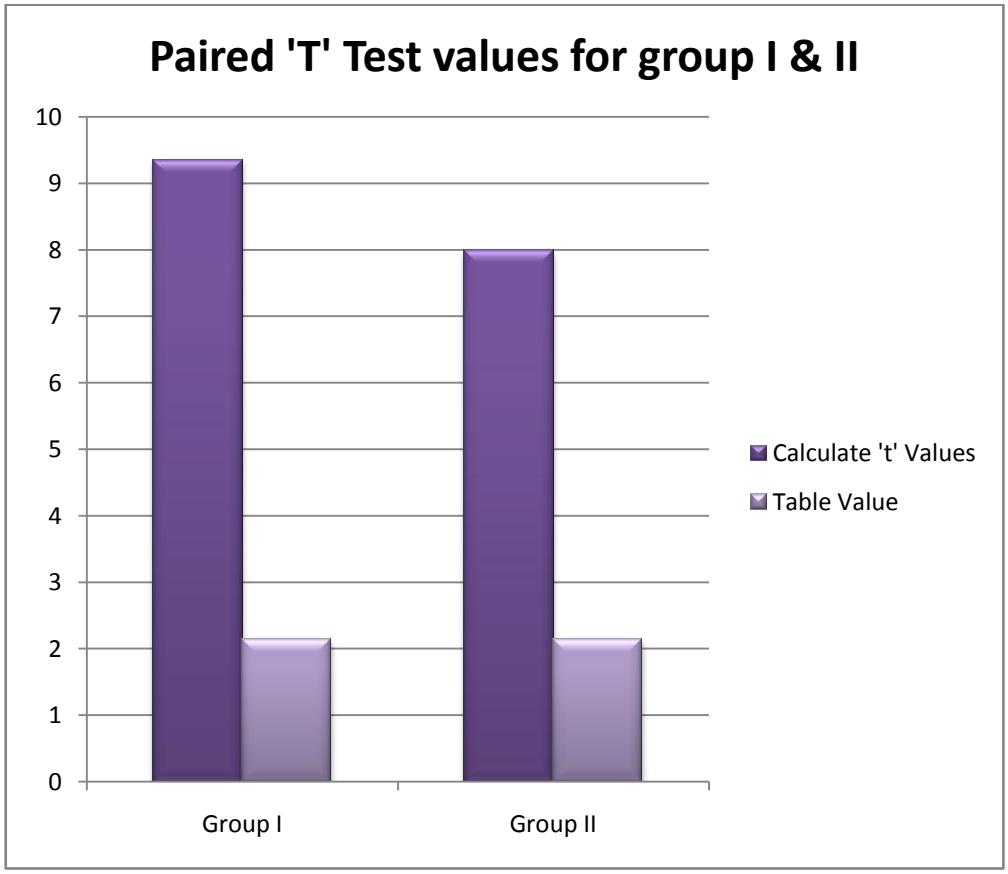


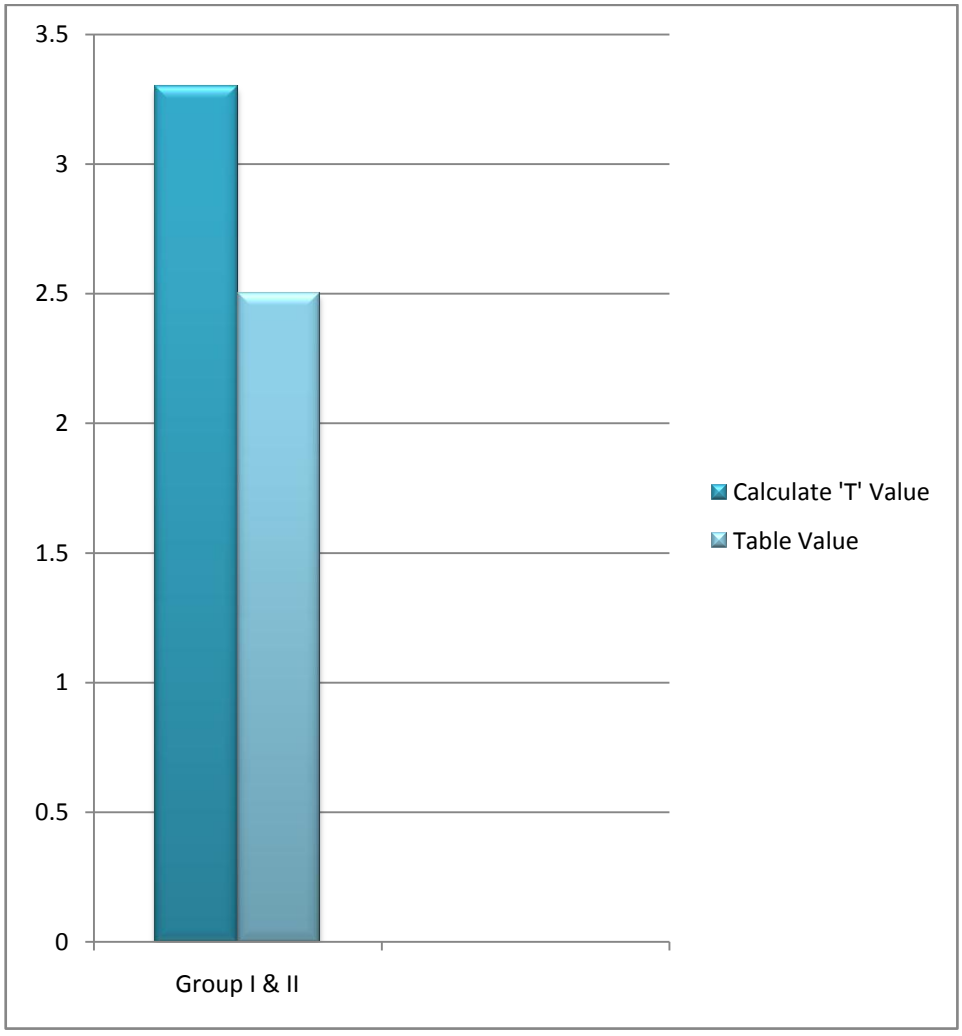
TABLE 4

UNPIRED 'T' TEST VALUE FOR GROUP I AND GROUP II

Comparison of Group I & II	**Calculated 't' Values**	**Table Values**
Un paired 't' Test	3.3	2.05

The table value for 5% LOS at 28 degrees of freedom is 2.05

The above table shows calculated Unpaired 't' test value and table value for Group I and Group II.



5. DISCUSSION

The purpose of the study was to compare the treatment effectiveness used in group I (muscle energy technique along with rocabado exercises) and group II temporomandibular joint excercises

In a recent review, **Desmeles F**, 2003 the inclusion criteria used in this study were reported as proper and the exclusion criteria as adequate because they control for conditions interfering with a successful outcome of treatment for patients with temporomandibular joint syndrome. The inclusion criteria were based on previous reports suggesting that subjects having pain and dysfunction will improve if they are given muscle energy technique along with rocabado exercises that encourage range of motion in temporomandibular joint.

NATLIE ANDERSON, Mr. CAMERON GOSLING, conducted a randomized trial of a specific muscle energy technique had an effect on the vertical range of opening of the mandible of the temporomandibular joint.

In this study based on literature available and data presentation patient achieved greater improvement in their quality of life, in muscle energy technique and rocabado exercises than in therapeutic jaw exercises. In this study the mean value for muscle energy technique and rocabado exercise were 5 and 2.6 and the standard deviation values were 2.07 and 1.26 This statistically proved improvement was further confirmed by calculating paired ‘t’ test and unpaired ‘t’ test values. The paired ‘t’ test values for group I was 9.35 and for group II was 7.9 and the unpaired ‘t’ test values was 3.3

EFFECTS OF TREATMENTS

In Group A, the subjects who underwent muscle energy technique along with rocabado exercises responded better than the subjects who were treated with therapeutic jaw exercises reduction of disability level in subjects of both groups indicates that both techniques are significantly effective in its own mechanism of approach. The reason for the inter group variation of subjects of might be due to added benefits of muscle energy technique along with therapeutic jaw exercises which could be explained as retention effect of exercises replicating as favorable effects on subject's daily activities.

AREA OF IMPROVEMENT

The beneficiary effects are reflected invariably all over the daily activities including the pain intensity. It transfers the benefits into other items of assessment.

LEVEL OF IMPROVEMENT

Subjects belonging to Group –A show better response not only in pain intensity item but also other Activities of Daily Living compared with subjects of Group –B. This exhibits muscle energy technique along with rocabado exercises aids the subjects in reducing the disability level due to its fruitful effects at Disability level rather than Impairment level. Thus muscle energy technique along with rocabado exercises serves as positive promoter in disability level

The intention of study is fulfilled at expected level by finding not only the better treatment protocol for people suffering from temporomandibular joint dysfunction, but also the level at which and how the muscle energy technique along with rocabado exercises proving its benefits over mere therapeutic jaw exercises.

Thus MET along with rocabado exercises augments the benefits of exercises and complete the study with an ideal solution for people suffering from temporomandibular joint dysfunction.

6. SUMMARY AND CONCLUSION

This study shows that application of either a muscle energy technique and rocabado exercises therapeutic jaw exercises produce an increase in range of motion and a decrease in pain in the temporomandibular joint. The muscle energy technique along with rocabado was ultimately mildly more effective than therapeutic jaw exercises.

Group I and Group II consists of each 15 patient, with age group between 20-50 years. They were assigned into any one of the group by convenience sampling technique accordingly. The total study duration was 6 months. The outcome measures were measured by using Helkimos Anamnestic Index and compared statistically using 't' test.

The paired t – test was used to compare the pre Vs post treatment scores. Results shows that both the groups of patient benefited more in past treatment sessions. So that there was a significant improvement in both the groups of patients between pre Vs post treatment regimens.

The unpaired t – test was used to compare the effectiveness of treatment group I and group II. The results showed that both group showed significant difference, but group I showed greater improvement.

This study concluded that muscle energy technique along with rocabado exercises has better effect that therapeutic jaw exercises in decreasing pain, increase range of motion, and improving function in temporomandibular joint dysfunction. We here to reject the null hypothesis and accepting the alternate hypothesis which states that "there was a significant difference in effects obtained by approaches used in group I and group II"

So we conclude that muscle energy technique (group I) was more effective than therapeutic jaw exercises (group II) in the treatment of temporomandibular joint dysfunction.

LIMITATIONS

1. ***Sample size***

   Small sample size with only 30 subjects.

2. ***Duration***

   Due to short duration patients with more chronic involvement may not respond as well as with their short duration counter parts.

3. ***Patient's Attitude***

   How well a subject attended the treatment, exercised, or adhered, their home program might influence the results of this study.

4. ***Miscellaneous***

   The effect of the following factors like time of testing; climatic conditions, psychological factors, nutrition regular activities of daily living could not be controlled during the testing period.

SUGGESTIONS

- Further studies should focus on the efficacy of various techniques in improving the temporomandibular joint dysfunction.

- The extended efficacy of these treatments may also be found out by increasing the total duration of the treatment.

- A Follow up period of 3 to 6 months necessary.

- Similar study can be done for larger group for longer duration.

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APPENDIX –I

TEMPOROMANDIBULAR JOINT REGIONAL EXAMINATION

Patient : File no : Date:

Student : Signature :

Clinician Signature :

……..…….

Present medical history :

Past medical history :

Observation

Posture of C- spine and head :

Facial symmetry :

Paralysis :

Malocclusion (cross bite or overbite) :

Deviation of mandible on opening or closing month :

Normal bulging of masseters when patient bites down :

Normal movement of tongue :

Palpation

Right **Left**

Cervical spine :

Facet joints

Muscles

Lymph Nodes

Mandibular condyles :

Tenderness

Mandible

Hyoid bone (normal movement on swallowing):

Mastoid Processes :

Movement (palpate with fingers in EAM):

- Smooth
- Symmetrical
- Pain / tenderness

Masseters :

Temporalis :

Thyroid cartilage and gland :

Parotid gland :

Teeth and gums :

Active Movements

Cervical spine : Flexion : Extension :

Lateral flexion : Rotation :

Opening the mouth : Deviation?

Functional opening (2-3 flexed PIP joints)

Closing the mouth : Deviation?

Resting position / Freeway Space (2-4mm)

Protrusion of mandible :

Retraction of mandible :

Lateral deviation of mandible :

Resisted Isometric Movements (perform with TMJ in resting position)

Opening (depression) :

Closing (elevation, occlusion) :

Lateral deviation :

Joint Play Movements

Inferior distraction (tissue stretch) :

Special Tests

Chovstek Test (facial nerve pathology) :

Auscultation of TMJ's :

Reflex

Jaw reflex (CN 5) :

APPENDIX –II

HELKIMOS ANAMNESTIC INDEX

Clinical dysfunction index, Di, based on evaluation of five common clinical symptoms (helkimo 1974)

A. Symptom: Impaired range of movement / mobility index

Criteria	:	Normal range of movement	0
		Slightly impaired mobility	1
		Severely impaired mobility	5

B. Symptom: Impaired TM-joint function

Criteria	:	Smooth movement without TM-Joint sounds and deviation on opening or closing movements ≤ 2 mm0	
		Tm-joint sounds in one or both joints and / or deviation > 2 mm on opening or closing movements 1	
		Locking and / or luxation of the TM-joint	

C. Symptom: Muscle Pain

Criteria	:	No tenderness to palpation in the masticatory muscles	
		Tenderness to palpation in 1-3 palpation sites	
		Tenderness to palpation in 4 or more palpation sites	

D. Symptom: Temporomandibular joint pain

Criteria	:	No tenderness to palpation	
		Tenderness to palpation laterally	
		Tenderness to palpation posteriorly	

E. Symptom: Pain on movement of the mandible

Criteria	:	No pain on movement	
		Pain on 1 movement	
		Pain on 2 or more movements	

F. Sum A + B + C + D + E – dysfunction score (0-25)

G. Dysfunciton group 0-5, according to score.

APPENDIX –III

TEMPOROMANDIBULAR QUESTIONNAIRE

1. Name :
2. Age :
3. Can you open the mouth without any difficulty? Yes/No
4. Do you feel that your mouth gets deviated when you open your mouth ? Yes/No
5. Do you experience any jaw clicking / cracking? Yes/No
6. Is your jaw movement limited in any way? Yes/No
7. Do you experience earache, ringing ears, dizziness or blocked or itching ears? Yes/No
8. Do you clench or grind your teeth habitually? Yes/No
9. Can you open the mouth without any difficulty? Yes/No
10. Have you recently been to a dentist or Maxillo Facial Surgeon? Did they fit a device? Yes/No
11. Do you experience pain over the side of your face, ear, temples and jaw? Yes/No
12. Does any movement aggravates your pain? Yes/No

APPENDIX –IV

GROUP I

PRE AND POST HELKIMOS ANAMNESTIC INDEX SCORES

S.No	PRE-HAI SCORE	POST – HAI SCORE	d	$(d-\bar{d})$	$(d-\bar{d})^2$
1	20	14	8	3	9
2	21	12	9	4	16
3	25	17	8	3	9
4	17	12	5	1	1
5	20	13	7	2	4
6	13	9	4	1	1
7	24	20	4	1	1
8	17	13	4	1	1
9	16	11	5	0	0
10	13	9	4	1	1
11	21	17	4	1	1
12	13	8	5	0	0
13	21	20	1	4	16
14	25	21	4	1	1
15	16	13	3	2	4

APPENDIX –V

GROUP –II

PRE AND POST HELKIMOS ANAMNESTIC INDEX SCORES

S.No	PRE-HAI SCORE	POST – HAI SCORE	d	$(d-\bar{d})$	$(d-\bar{d})^2$
1	24	20	4	1	1
2	13	10	3	0	0
3	20	16	4	1	1
4	16	13	3	0	0
5	16	14	2	2	4
6	21	18	3	0	0
7	21	20	1	2	4
8	25	19	6	3	6
9	17	16	1	2	4
10	13	11	2	1	1
11	16	12	4	1	1
12	17	15	2	1	1
13	20	20	0	0	0
14	17	17	1	1	1
15	25	22	3	0	0

APPENDIX –V

INFORMED CONSENT

This is to certify that I, …… totally agree to be a subject for the project work **"EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE AND ROCABADO EXERCISE VERSUS THERAPEUTIC JAW EXERCISES FOR TEMPOROMANDIBULAR JOINT DYSFUNCTION"** and I assure that I will not initiate or undergo any other treatment or concurrent exercise programme during the course of this study.

I own all the responsibilities of my health condition, if any untoward development happened during the course of this study.

Date : Signature of the Patient

Date : Signature of the Candidate